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LISTS OF SPECIES

Marine and estuarine fish diversity in the inner Gulf of Nicoya, Pacific coast of Costa Rica, Central America

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ABSTRACT: A checklist of the marine and estuarine fishes of the inner part of the Gulf of Nicoya, Pacific coast of Costa Rica, Central America, was compiled by examining a museum fish collection, resulting in 72 families and 274 species. Of these species, 127 (46.4%) were marine species and 147 (53.6%) were estuarine-associated species. In terms of their life history and considering the habitat type classification, 188 (almost 70% of the total) were categorized as species inhabiting soft-bottom habitats, reflecting the large estuarine environment and rich fish diversity of the Gulf despite its relatively small area in the tropical Eastern Pacific region. Furthermore, the list contains 13 threatened species of IUCN Red List, which need further research to understand their abundance and their exposure to habitat loss in the Gulf. Further detailed studies on its fish fauna and habitat are needed to better understand and conserve biodiversity within the whole Gulf.

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INTRODUCTION

The Gulf of Nicoya is located on the northwestern coast of Costa Rica (10° N, 85° W) in the Eastern Pacific. It is considered the most important fishing ground for finfish, penaeid shrimp, and shellfish in Costa Rica (Vargas 1995; Vargas and Mata 2004). A number of rivers flow into the Gulf, the most significant of which is the Tempisque River, located at the innermost point of the waterway. The fresh water from these rivers helps to provide a very productive estuarine habitat in the confines of the Gulf (Vargas and Mata 2004; Wehrtmann and Cortés 2009). The Tempisque River creates strong horizontal and vertical salinity gradients in the central region of the upper Gulf, a zone characterized by mangrove forests, sand- and mudflats, and sandy beaches.

Bartels *et al.* (1983) researched the distribution, diversity and abundance of fishes by trawl sampling, and recorded 214 species (composed mainly of fishery species) from the entire Gulf. However, their species list included a number of unidentified species due to the limited taxonomic information at that time, and no data for voucher specimens (*e.g.*, specimen registration number and/or institution) were provided. Basing species lists on voucher specimens is foundational to faunistic and ecological studies because it helps avoid many types of errors such as misidentifications and systematic problems within poorly known taxonomic groups (Biological Survey of Canada 2003). In addition, categorizing each listed species to an ecological niche in a specific geographic area increases the understanding of a given ecosystem's characteristics, and helps estimate biodiversity potentially leading to improved local conservation policies. The abundance and distribution of any threatened species are particularly important, and research leading to the acquisition of such data should be prioritized. Despite the importance of biodiversity information coupled with the designation of voucher specimens, such data are not available for fish species in the Gulf of Nicoya.

However, since 1962, numerous fish specimens from the Pacific coast of Costa Rica, including from the Gulf of Nicoya, have been collected and deposited in the Museo de Zoología of the Universidad de Costa Rica (UCR) by the fourth and fifth authors (Bussing and López 2009). In order to contribute to the understanding of marine biodiversity in the Gulf and to provide a foundational baseline for future biodiversity conservation, we herein provide a list of marine and estuarine fish species of the inner Gulf, which is composed mainly of estuarine habitat, based on the collections of the Museo de Zoología, UCR. Ecological information on, and the red-list status of, each species are also provided. This is the first list of a marine fish fauna in Costa Rica that links distribution and abundance data to voucher specimens.

MATERIALS AND METHODS

The inner part of the Gulf of Nicoya is shallow (around 20 m depth) and is provided with estuarine characteristics by the freshwater input mainly from the Tempisque

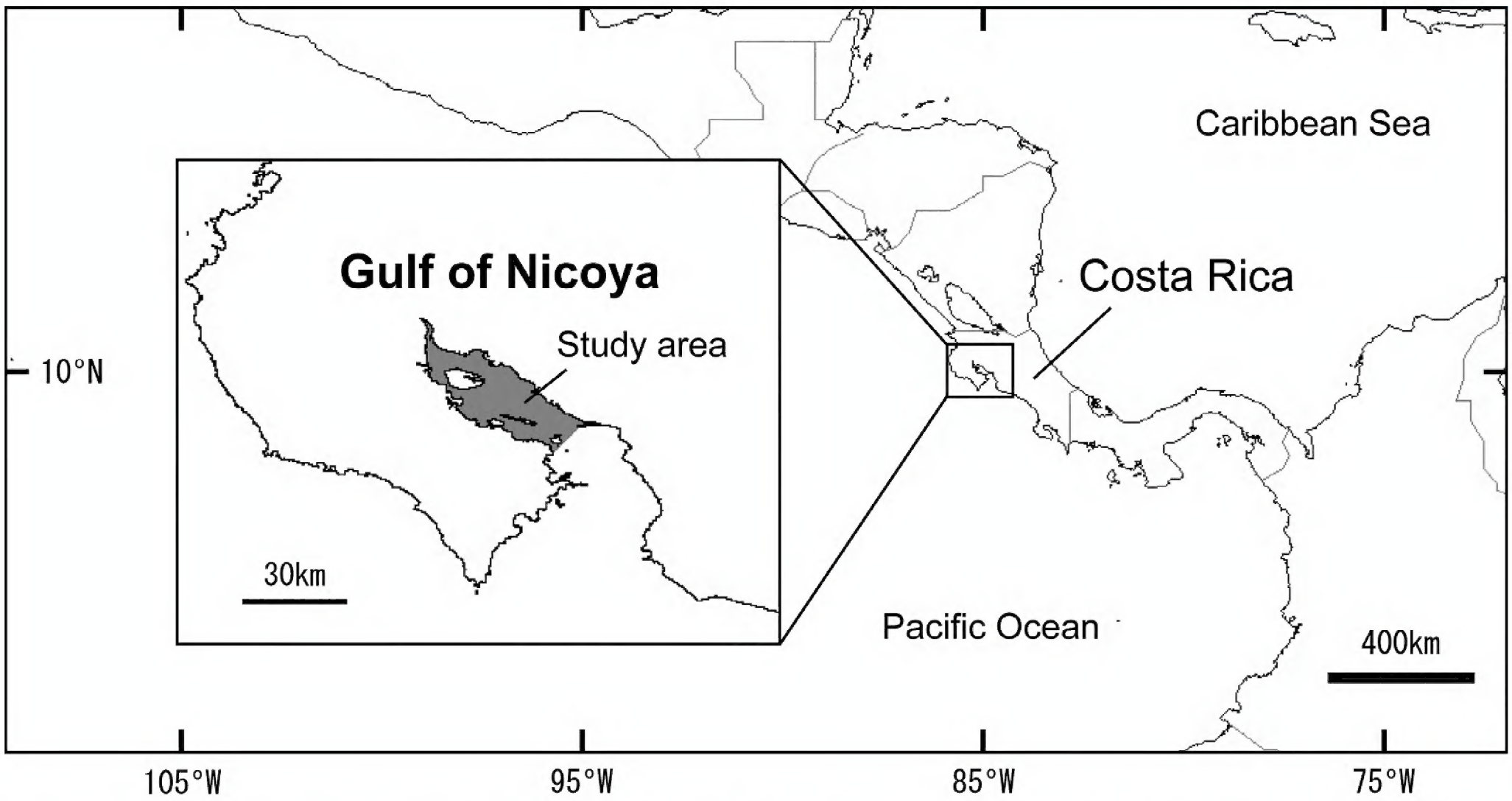

FIGURE 1. Map showing the study area (grayish area) in the inner Gulf of Nicoya, Pacific Coast of Costa Rica, Central America.

River (Vargas and Mata 2004). In order to document the diversity of marine and estuarine fishes in the estuarine habitat of the inner Gulf, this study was restricted to the upper zone of the Gulf from a line connecting the tip of Puntarenas city (9°58′35.399″ N, 84°51′5.400″ W) and the tip of Punta Gigante (9°54′10.440″ N, 84°54′55.799″ W), which combines "Zone B" and "Zone C" of Araya (1984) (Figure 1). The northernmost point of the study area was the first bridge across Tempisque River (10°14′53″ N, 85°14′35″ W).

The specimens collected from within the study area were extracted from collections deposited in the Museo de Zoología of the Universidad de Costa Rica (UCR), and identified following Robertson and Allen (2008). For groups revised since Robertson and Allen (2008), scientific names were determined from the revisionary papers, and these papers are listed in the 'Taxonomic and ecological remarks' below. The size of specimen was usually expressed as standard length (SL), but sometimes as fork length (FL), total length (TL) or disc width (DW). The life history status of each species was determined from ecological information described in Robertson and Allen (2008) and Froese and Pauly (2011) as follows: marine species—living in marine environment and generally not entering estuarine or freshwater habitats; marine-estuarine species—utilizing marine and brackish environments (such as estuaries and river mouths); estuarine species—mainly utilizing estuarine environments (including mangrove areas) as its habitat; freshwater-estuarine species—mainly inhabiting brackish and freshwater environments (not including species sometimes entering rivers); amphidromous species—utilizing both marine and freshwater environments. The latter four categories are summarized as estuarine-associated species. Furthermore, to better understand the habitat characteristics of the Gulf based on species composition, habitat type was also divided into the following four categories (referring to the same literature as for life history status): soft-bottom species—living on mud and flat bottoms, including estuarine mangrove areas; reef-associated species—mainly inhabiting the reef zone and its adjacent habitat; pelagic species – living and feeding in the open sea (deep water species are also included in this category); multiple habitat species—utilizing both rocky reef and soft bottom habitats. The IUCN red list (IUCN 2013) was used to categorize the conservation status of each species recorded in this study as follows (in order of threat level): No E, not evaluated; DD, data deficient; LC, least concern; NT, near threatened; VU, vulnerable; EN, endangered; CR, critically endangered. The systematic order followed Nelson (2006) but was alphabetically arranged at species level. All species names recorded in the present study are listed in Table 1, with relevant ecological information as detailed above. All the UCR material examined and designated as vouchers are listed in the appendix, including the number of individuals and their size in mm.

RESULTS

The museum collection survey identified a total of 274 fish species, representing 72 families in 26 orders, from within the inner part of the Gulf of Nicoya (Table 1). The top 25 dominant families in terms of number of species are shown in Table 2. The most speciose family is Sciaenidae (31 species, 11.4% of total) followed by Gobiidae (19, 7.0%), Carangidae (18, 6.6%), Haemulidae (18, 6.6%), Ariidae (14, 5.1%), Engraulidae (12, 4.4%), and Serranidae (10, 3.7%); the remaining families are represented by fewer than 10 species each. The dominance of some families such as Sciaenidae and Gobiidae in the inner Gulf corresponds well with the species composition of the whole fish fauna of the Tropical

Eastern Pacific (TEP) (Robertson and Allen 2008).

The designation of life history status for each species divided the fauna into 127 marine species (46.4% of total), 100 marine-estuarine species (36.5%), 13 estuarine species (4.7%), 10 freshwater-estuarine species (3.6%) and 24 amphidromous species (8.8%). Estuarine-associated species account for 53.6% of the fauna (Figure 2A). With reference to habitat type classification, 188 were soft bottom species (68.6% of total), 33 reef-associated species (12.0%), 44 pelagic species (16.1%) and 9 multiple habitat

Table 1. Species list of marine and estuarine fishes recorded from the inner Gulf of Nicoya, Pacific coast of Costa Rica, central America. Numbers in parentheses next to the family name indicate the number of species recorded from that family. Taxonomic and ecological remarks on the species marked with an asterisk were given in the text. Abbreviations for the IUCN Red List are as follows: CR, critically endangered; DD, data deficient; EN, endangered; LC, least concern; No E, not evaluated; NT, near threatened; VU, vulnerable. The Catalog Number of the UCR voucher specimen, and the number of specimens and their size range, were provided in the appendix.

SPECIES NO.	TAXON	LIFE HISTORY STATUS	HABITAT TYPE	IUCN RED LIST
	Order Carchariniformes			
	Family Triakidae (1)			
1	*Mustelus henlei* (Gill, 1863)	Marine	Soft bottom	LC
	Family Carcharinidae (1)			
2	*Carcharhinus porosus* (Ranzani, 1839)	Marine-estuarine	Soft bottom	DD
	Family Sphyrnidae (2)			
3	*Sphyrna lewini* (Griffith & Smith, 1834)	Marine-estuarine	Pelagic	EN
4	*Sphyrna tiburo* (Linnaeus, 1758)	Marine-estuarine	Multiple habitat	LC
	Order Echinorhiniformes			
	Family Echinorhinidae (1)			
5	*Echinorhinus cookei* Pietschmann, 1928	Marine	Pelagic	NT
	Order Torpediniformes			
	Family Narcinidae (3)			
6	*Diplobatis ommata* (Jordan & Gilbert in Jordan & Bollman, 1890)	Marine	Soft bottom	VU
7	*Narcine entemedor* Jordan & Starks, 1895	Marine	Soft bottom	DD
8	*Narcine vermiculatus* Breder, 1928	Marine	Soft bottom	NT
	Order Pristiformes			
	Family Pristidae (1)			
9	*Pristis pristis* (Linnaeus, 1758)	Amphidromous	Soft bottom	CR
	Order Rajiformes			
	Family Rhinobatidae (2)			
10	*Rhinobatos leucorhynchus* Günther, 1867	Marine	Soft bottom	NT
11	*Zapteryx xyster* Jordan & Evermann, 1896	Marine	Soft bottom	DD
	Order Myliobatiformes			
	Family Urotrygonidae (4)			
12	*Urotrygon chilensis* (Günther, 1872)	Marine	Soft bottom	DD
13	*Urotrygon cimar* López & Bussing, 1998	Marine	Soft bottom	No E
14	*Urotrygon nana* Miyake & McEachran, 1988	Marine	Soft bottom	DD
15	*Urotrygon* sp.*	Marine	Soft bottom	-
	Family Dasyatidae (1)			
16	*Dasyatis longa* (Garman, 1880)*	Marine-estuarine	Soft bottom	DD
	Family Myliobatidae (1)			
17	*Aetobatus narinari* (Euphrasen, 1790)	Marine-estuarine	Reef-associated	NT
	Order Elopiformes			
	Family Elopidae (1)			
18	*Elops affinis* Regan, 1909	Marine-estuarine	Pelagic	DD
	Order Albuliformes			
	Family Albulidae (2)			
19	*Albula esuncula* (Garman, 1899)	Marine-estuarine	Multiple habitat	LC
20	*Albula pacifica* (Beebe, 1942)	Marine-estuarine	Soft bottom	No E
	Order Anguilliformes			
	Family Moringuidae (1)			
21	*Neoconger vermiformis* Gilbert, 1890	Marine	Soft bottom	LC
	Family Muraenidae (2)			
22	*Gymnothorax dovii* (Günther, 1870)	Marine	Reef-associated	LC
23	*Muraena clepsydra* Gilbert in Jordan & Evermann, 1898	Marine	Reef-associated	LC
	Family Ophichthidae (6)			
24	*Echiophis brunneus* (Castro-Aguirre & Suárez de los Cobos, 1983)	Marine	Soft bottom	LC
25	*Myrichthys tigrinus* Girard, 1859	Marine	Soft bottom	LC
26	*Myrophis vafer* Jordan & Gilbert, 1883	Marine	Soft bottom	LC
27	*Ophichthus frontalis* (Garman, 1899)	Marine	Soft bottom	LC
28	*Ophichthus remiger* (Valenciennes, 1842)	Marine	Soft bottom	LC
29	*Pisodonophis daspilotus* Gilbert in Jordan & Evermann, 1898	Estuarine	Soft bottom	NT

Table 1. *Continued.*

SPECIES NO.	TAXON	LIFE HISTORY STATUS	HABITAT TYPE	IUCN RED LIST
	Family Muraenesocidae (1)			
30	*Cynoponticus coniceps* (Jordan & Gilbert, 1882)	Marine	Soft bottom	DD
	Order Clupeiformes			
	Family Pristigasteridae (6)			
31	*Ilisha fuerthii* (Steindachner, 1875)	Marine-estuarine	Pelagic	LC
32	*Neoopisthopterus tropicus* (Hildebrand, 1946)	Marine-estuarine	Pelagic	LC
33	*Odontognathus panamensis* (Steindachner, 1876)	Marine	Pelagic	LC
34	*Opisthopterus dovii* (Günther, 1868)	Marine	Pelagic	LC
35	*Opisthopterus equatorialis* Hildebrand, 1946	Marine	Pelagic	LC
36	*Pliosteostoma lutipinnis* (Jordan & Gilbert, 1882)	Marine	Pelagic	LC
	Family Engraulidae (12)			
37	*Anchoa curta* (Jordan & Gilbert, 1882)	Marine-estuarine	Pelagic	LC
38	*Anchoa ischana* (Jordan & Gilbert, 1882)	Marine	Pelagic	LC
39	*Anchoa lucida* (Jordan & Gilbert, 1882)	Marine-estuarine	Pelagic	LC
40	*Anchoa mundeola* (Gilbert & Pierson in Jordan & Evermann, 1898)	Marine-estuarine	Pelagic	LC
41	*Anchoa nasus* (Kner & Steindachner, 1867)	Marine-estuarine	Pelagic	LC
42	*Anchoa panamensis* (Steindachner, 1877)	Marine-estuarine	Pelagic	LC
43	*Anchoa spinifer* (Valenciennes in Cuvier & Valenciennes, 1848)	Amphidromous	Pelagic	No E
44	*Anchoa starksi* (Gilbert & Pierson, 1898)	Marine-estuarine	Pelagic	LC
45	*Anchoa walkeri* Baldwin & Chang, 1970	Amphidromous	Pelagic	LC
46	*Anchovia macrolepidota* (Kner, 1863)	Marine-estuarine	Pelagic	LC
47	*Cetengraulis mysticetus* (Günther, 1867)	Marine-estuarine	Pelagic	LC
48	*Lycengraulis poeyi* (Kner, 1863)	Marine-estuarine	Pelagic	LC
	Family Clupeidae (3)			
49	*Harengula thrissina* (Jordan & Gilbert, 1882)	Marine-estuarine	Pelagic	LC
50	*Lile stolifera* (Jordan & Gilbert, 1882)	Marine-estuarine	Pelagic	LC
51	*Opisthonema libertate* (Günther, 1867)	Marine	Soft bottom	LC
	Order Gonorynchiformes			
	Family Chanidae (1)			
52	*Chanos chanos* (Forsskäl, 1775)	Amphidromous	Soft bottom	No E
	Order Siluriformes			
	Family Ariidae (14)			
53	*Ariopsis guatemalensis* (Günther, 1864)	Amphidromous	Soft bottom	LC
54	*Ariopsis seemanni* (Günther, 1864)	Amphidromous	Soft bottom	LC
55	*Bagre panamensis* (Gill, 1863)	Marine-estuarine	Soft bottom	LC
56	*Bagre pinnimaculatus* (Steindachner, 1877)	Amphidromous	Soft bottom	LC
57	*Cathorops dasycephalus* (Günther, 1864)	Marine-estuarine	Soft bottom	LC
58	*Cathorops fuerthii* (Steindachner, 1877)	Amphidromous	Soft bottom	DD
59	*Cathorops steindachneri* (Gilbert & Starks, 1904)	Amphidromous	Soft bottom	DD
60	*Cathorops tuyra* (Meek & Hildebrand, 1923)	Amphidromous	Soft bottom	DD
61	*Notarius biffi* Betancur & Acero 2004	Marine-estuarine	Soft bottom	LC
62	*Notarius cookei* Acero & Betancur 2002	Estuarine	Soft bottom	VU
63	*Notarius kessleri* (Steindachner, 1877)	Marine-estuarine	Soft bottom	LC
64	*Notarius troschelii* (Gill, 1863)	Marine-estuarine	Soft bottom	LC
65	*Occidentarius platypogon* Günther, 1864	Marine-estuarine	Soft bottom	LC
66	*Sciades dowii* (Gill, 1863)	Amphidromous	Soft bottom	LC
	Order Ateleopodiformes			
	Family Ateleopodidae (1)			
67	*Guentherus altivela* Osório, 1917	Marine	Pelagic	No E
	Order Aulopiformes			
	Family Synodontidae (2)			
68	*Synodus scituliceps* Jordan & Gilbert, 1882	Marine	Soft bottom	LC
69	*Synodus sechurae* Hildebrand, 1946	Marine	Soft bottom	LC
	Order Ophidiiformes			
	Family Ophidiidae (1)			
70	*Lepophidium prorates* (Jordan & Bollman, 1890)	Marine	Soft bottom	LC
	Order Batrachoidiformes			
	Family Batrachoididae (5)			
71	*Batrachoides boulengeri* (Gilbert & Starks, 1904)	Marine-estuarine	Soft bottom	VU
72	*Batrachoides pacifici* (Günther, 1861)	Marine-estuarine	Soft bottom	LC
73	*Batrachoides waltersi* Collette & Russo, 1981	Marine-estuarine	Soft bottom	LC
74	*Porichthys greenei* Gilbert & Starks, 1904	Marine	Soft bottom	LC
75	*Porichthys margaritatus* (Richardson, 1844)	Marine	Soft bottom	LC

Table 1. *Continued.*

SPECIES NO.	TAXON	LIFE HISTORY STATUS	HABITAT TYPE	IUCN RED LIST
	Order Lophiiiformes			
	Family Antennariidae (1)			
76	*Fowlerichthys avalonis* (Jordan & Starks 1907)*	Marine	Soft bottom	LC
	Order Mugiliformes			
	Family Mugilidae (3)			
77	*Agonostomus monticola* (Bancroft in Griffith & Smith, 1834)	Amphidromous	Pelagic	LC
78	*Mugil curema* Valenciennes in Cuvier & Valenciennes, 1836	Marine-estuarine	Soft bottom	No E
79	*Mugil hospes* Jordan & Culver in Jordan, 1895	Marine-estuarine	Soft bottom	LC
	Order Atheriniformes			
	Family Atherinopsidae (2)			
80	*Atherinella argentea* Chernoff, 1986	Freshwater-estuarine	Soft bottom	LC
81	*Membras gilberti* (Jordan & Bollmann, 1890)	Marine	Pelagic	LC
	Order Beloniformes			
	Family Exocoetidae (2)			
82	Excoetidae sp.	Marine	Pelagic	-
83	*Fodiator rostratus* (Günther, 1866)	Marine	Pelagic	LC
	Family Hemiramphidae (3)			
84	*Hemiramphus saltator* Gilbert & Starks, 1904	Marine	Pelagic	LC
85	*Hyporhamphus naos* Banford & Collette, 2001	Marine-estuarine	Pelagic	LC
86	*Hyporhamphus snyderi* Meek & Hildebrand, 1923	Marine	Pelagic	LC
	Family Belonidae (2)			
87	*Strongylura exilis* (Girard, 1854)	Amphidromous	Pelagic	LC
88	*Tylosurus crocodilus fodiator* Jordan & Gilbert, 1882	Marine	Pelagic	LC
	Order Cyprinodontiformes			
	Family Anablepidae (1)			
89	*Oxyzygonectes dovii* (Günther, 1866)	Freshwater-estuarine	Soft bottom	No E
	Family Poeciliidae (2)			
90	*Poeciliopsis elongata* (Günther, 1866)	Estuarine	Soft bottom	NT
91	*Poeciliopsis turrubarensis* (Meek, 1912)	Freshwater-estuarine	Soft bottom	LC
	Order Gasterosteiformes			
	Family Syngnathidae (2)			
92	*Hippocampus ingens* Girard, 1858	Marine	Reef-associated	VU
93	*Syngnathus auliscus* (Swain, 1882)	Marine-estuarine	Soft bottom	LC
	Family Fistulariidae (2)			
94	*Fistularia commersonii* Rüppell, 1838	Marine	Reef-associated	No E
95	*Fistularia corneta* Gilbert & Starks, 1904	Marine	Multiple habitat	LC
	Order Scorpaeniformes			
	Family Scorpaenidae (1)			
96	*Scorpaena mystes* Jordan & Starks in Jordan, 1895	Marine	Reef-associated	LC
	Family Triglidae (3)			
97	*Prionotus horrens* Richardson, 1844	Marine	Soft bottom	LC
98	*Prionotus ruscarius* Gilbert & Starks, 1904	Marine	Soft bottom	LC
99	*Prionotus stephanophrys* Lockington, 1881	Marine	Soft bottom	LC
	Order Perciformes			
	Family Centropomidae (5)			
100	*Centropomus armatus* Gill, 1863	Amphidromous	Soft bottom	LC
101	*Centropomus medius* Günther, 1864	Amphidromous	Soft bottom	LC
102	*Centropomus nigrescens* Günther, 1864	Amphidromous	Soft bottom	LC
103	*Centropomus robalito* Jordan & Gilbert, 1882	Amphidromous	Soft bottom	LC
104	*Centropomus unionensis* Bocourt, 1868	Amphidromous	Soft bottom	LC
	Family Serranidae (10)			
105	*Alphestes multiguttatus* (Günther, 1867)	Marine	Reef-associated	LC
106	*Diplectrum eumelum* Rosenblatt & Johnson, 1974	Marine	Soft bottom	LC
107	*Diplectrum macropoma* (Günther, 1864)	Marine	Soft bottom	LC
108	*Diplectrum pacificum* Meek & Hildebrand, 1925	Marine	Soft bottom	LC
109	*Epinephelus analogus* Gill, 1863	Marine-estuarine	Reef-associated	LC
110	*Epinephelus labriformis* (Jenyns, 1840)	Marine	Reef-associated	LC
111	*Hyporthodus acanthistius* (Gilbert, 1892)*	Marine	Reef-associated	LC
112	*Hyporthodus exsul* (Fowler, 1944)*	Marine	Reef-associated	DD
113	*Hyporthodus niphobles* (Gilbert & Starks in Gilbert, 1897)*	Marine	Reef-associated	DD
114	*Rypticus nigripinnis* Gill, 1861	Marine	Reef-associated	LC
	Family Opistognathidae (2)			
115	*Lonchopisthus sinuscalifornicus* Castro-Aguirre & Villavicencio-Garayzar, 1988	Marine	Soft bottom	LC
116	*Opistognathus scops* (Jenkins & Evermann, 1889)	Marine	Soft bottom	LC

Table 1. *Continued.*

SPECIES NO.	TAXON	LIFE HISTORY STATUS	HABITAT TYPE	IUCN RED LIST
	Family Coryphaenidae (1)			
117	*Coryphaena hippurus* Linnaeus, 1758	Marine	Pelagic	LC
	Family Carangidae (18)			
118	*Caranx caballus* (Günther, 1868)	Marine-estuarine	Pelagic	LC
119	*Caranx caninus* Günther, 1867	Marine-estuarine	Pelagic	LC
120	*Caranx sexfasciatus* Quoy & Gaimard, 1825	Marine-estuarine	Pelagic	LC
121	*Caranx vinctus* (Jordan & Gilbert, 1882)	Marine	Pelagic	LC
122	*Gnathanodon speciosus* (Forsskål, 1775)	Marine	Multiple habitat*	No E
123	*Hemicaranx leucurus* (Günther, 1864)	Marine-estuarine	Soft bottom	LC
124	*Hemicaranx zelotes* Gilbert in Jordan & Evermann, 1898	Marine-estuarine	Soft bottom	LC
125	*Oligoplites altus* (Günther, 1868)	Marine-estuarine	Soft bottom	LC
126	*Oligoplites refulgens* Gilbert & Starks, 1904	Marine-estuarine	Pelagic	LC
127	*Oligoplites saurus inornatus* (Bloch & Schneider, 1801)	Marine-estuarine	Soft bottom	No E
128	*Selar crumenophthalmus* (Bloch, 1793)	Marine	Pelagic	No E
129	*Selene brevoortii* (Gill, 1863)	Marine	Soft bottom	LC
130	*Selene orstedii* Lütken, 1880	Marine	Soft bottom	LC
131	*Selene peruviana* (Guichenot, 1866)	Marine	Soft bottom	LC
132	*Seriola* sp.	Marine	Pelagic	-
133	*Trachinotus kennedyi* Steindachner, 1876	Marine-estuarine	Soft bottom	LC
134	*Trachinotus paitensis* Cuvier in Cuvier & Valenciennes, 1832	Marine	Soft bottom	LC
135	*Trachinotus rhodopus* Gill, 1863	Marine	Multiple habitat	LC
	Family Lutjanidae (5)			
136	*Lutjanus aratus* (Günther, 1864)	Marine-estuarine	Multiple habitat	LC
137	*Lutjanus argentiventris* (Peters, 1869)	Marine-estuarine	Reef-associated	LC
138	*Lutjanus colorado* Jordan & Gilbert, 1882	Marine-estuarine	Reef-associated	LC
139	*Lutjanus guttatus* (Steindachner, 1869)	Marine-estuarine	Reef-associated	LC
140	*Lutjanus novemfasciatus* Gill, 1862	Marine-estuarine	Reef-associated	LC
	Family Lobotidae (1)			
141	*Lobotes pacificus* Gilbert in Jordan & Evermann, 1898	Marine-estuarine	Pelagic	LC
	Family Gerreidae (7)			
142	*Diapterus aureolus* (Jordan & Gilbert, 1882)	Marine	Soft bottom	LC
143	*Diapterus brevirostris* (Sauvage, 1879)*	Marine-estuarine	Soft bottom	No E
144	*Eucinostomus currani* Zahuranec in Yáñez-Arancibia, 1980	Amphidromous	Soft bottom	LC
145	*Eucinostomus dowii* (Gill, 1863)	Marine-estuarine	Soft bottom	LC
146	*Eucinostomus gracilis* (Gill, 1862)	Marine-estuarine	Soft bottom	LC
147	*Eugerres brevimanus* (Günther, 1864)	Amphidromous	Soft bottom	LC
148	*Gerres simillimus* Reagan, 1907	Marine-estuarine	Soft bottom	LC
	Family Haemulidae (18)			
149	*Anisotremus caesius* (Jordan & Gilbert, 1882)	Marine	Reef-associated	LC
150	*Anisotremus interruptus* (Gill, 1862)	Marine	Reef-associated	LC
151	*Conodon serrifer* Jordan & Gilbert, 1882	Marine	Soft bottom	LC
152	*Genyatremus dovii* (Günther, 1864)*	Marine	Soft bottom	LC
153	*Genyatremus pacifici* (Günther, 1864)*	Marine-estuarine	Soft bottom	LC
154	*Haemulon maculicauda* (Gill, 1862)	Marine	Reef-associated	LC
155	*Haemulon scudderii* Gill, 1862	Marine	Reef-associated	LC
156	*Haemulon steindachneri* (Jordan & Gilbert, 1882)	Marine	Multiple habitat	LC
157	*Haemulopsis axillaris* (Steindachner, 1869)	Marine	Soft bottom	LC
158	*Haemulopsis elongatus* (Steindachner, 1879)	Marine	Soft bottom	LC
159	*Haemulopsis leuciscus* (Günther, 1864)	Marine-estuarine	Soft bottom	LC
160	*Haemulopsis nitidus* (Steindachner, 1869)	Marine	Soft bottom	LC
161	*Pomadasys bayanus* Jordan & Evermann, 1898	Amphidromous	Soft bottom	No E
162	*Pomadasys branickii* (Steindachner, 1879)	Marine-estuarine	Soft bottom	LC
163	*Pomadasys empherus* Bussing, 1993	Freshwater-estuarine	Soft bottom	DD
164	*Pomadasys macracanthus* (Günther, 1864)	Marine-estuarine	Soft bottom	LC
165	*Pomadasys panamensis* (Steindachner, 1876)	Marine	Soft bottom	LC
166	*Xenichthys xanti* Gill, 1863	Marine	Soft bottom	LC
	Family Polynemidae (2)			
167	*Polydactylus approximans* (Lay & Bennett, 1839)	Marine-estuarine	Soft bottom	LC
168	*Polydactylus opercularis* (Gill, 1863)	Marine-estuarine	Soft bottom	LC
	Family Sciaenidae (31)			
169	*Bairdiella armata* Gill, 1863	Marine-estuarine	Soft bottom	LC
170	*Bairdiella ensifera* (Jordan & Gilbert, 1882)	Marine-estuarine	Soft bottom	LC
171	*Cynoscion albus* (Günther, 1864)	Marine-estuarine	Soft bottom	DD
172	*Cynoscion phoxocephalus* Jordan & Gilbert, 1882	Marine-estuarine	Soft bottom	LC

Table 1. *Continued.*

SPECIES NO.	TAXON	LIFE HISTORY STATUS	HABITAT TYPE	IUCN RED LIST
173	*Cynoscion reticulatus* (Günther, 1864)	Marine-estuarine	Soft bottom	LC
174	*Cynoscion squamipinnis* (Günther, 1867)	Marine-estuarine	Soft bottom	LC
175	*Cynoscion stolzmanni* (Steindachner, 1879)	Marine-estuarine	Soft bottom	LC
176	*Elattarchus archidium* (Jordan & Gilbert, 1882)	Marine	Soft bottom	LC
177	*Isopisthus remifer* Jordan & Gilbert, 1882	Marine-estuarine	Soft bottom	LC
178	*Larimus acclivis* Jordan & Bristol in Jordan & Evermann, 1898	Marine	Soft bottom	LC
179	*Larimus effulgens* Gilbert in Jordan & Evermann, 1898	Marine	Soft bottom	LC
180	*Larimus pacificus* Jordan & Bollman, 1890	Marine	Soft bottom	LC
181	*Menticirrhus elongatus* (Günther, 1864)	Marine	Soft bottom	LC
182	*Menticirrhus nasus* (Günther, 1868)	Marine-estuarine	Soft bottom	LC
183	*Menticirrhus panamensis* (Steindachner, 1875)	Marine	Soft bottom	LC
184	*Micropogonias altipinnis* (Günther, 1864)	Marine-estuarine	Soft bottom	LC
185	*Nebris occidentalis* Vaillant, 1897	Marine-estuarine	Soft bottom	LC
186	*Ophioscion scierus* (Jordan & Gilbert, 1884)	Marine	Soft bottom	LC
187	*Ophioscion strabo* Gilbert,1897	Marine	Soft bottom	LC
188	*Ophioscion typicus* Gill, 1863	Marine-estuarine	Soft bottom	LC
189	*Paralonchurus dumerilii* (Bocourt, 1869)	Marine-estuarine	Soft bottom	LC
190	*Paralonchurus goodei* Gilbert in Jordan & Evermann, 1898	Marine-estuarine	Soft bottom	LC
191	*Paralonchurus petersii* Bocourt, 1869	Marine	Soft bottom	LC
192	*Stellifer chrysoleuca* (Günther, 1867)	Marine	Soft bottom	LC
193	*Stellifer ephelis* Chirchigno, 1974	Marine	Soft bottom	LC
194	*Stellifer ericymba* (Jordan & Gilbert, 1882)	Marine	Soft bottom	LC
195	*Stellifer fuerthii* (Steindachner, 1876)	Marine	Soft bottom	LC
196	*Stellifer illecebrosus* Gilbert in Jordan & Evermann, 1898	Marine	Soft bottom	LC
197	*Stellifer oscitans* (Jordan & Gilbert, 1882)	Marine-estuarine	Soft bottom	LC
198	*Stellifer zestocarus* Gilbert in Jordan & Evermann, 1898	Marine-estuarine	Soft bottom	LC
199	*Umbrina xanti* Gill, 1862	Marine	Soft bottom	LC
	Family Mullidae (1)			
200	*Pseudupeneus grandisquamis* (Gill, 1863)	Marine	Soft bottom	LC
	Family Kyphosidae (1)			
201	*Kyphosus elegans* (Peters, 1869)	Marine	Reef-associated	LC
	Family Chaetodontidae (1)			
202	*Chaetodon humeralis* Günther, 1860	Marine	Reef-associated	LC
	Family Cirrhitidae (1)			
203	*Cirrhitus rivulatus* Valenciennes, 1846	Marine	Reef-associated	LC
	Family Pomacentridae (1)			
204	*Abudefduf troschelii* (Gill, 1862)	Marine	Reef-associated	LC
	Family Uranoscopidae (1)			
205	*Astroscopus zephyreus* Gilbert & Starks in Gilbert, 1897	Marine	Soft bottom	LC
	Family Dactyloscopidae (1)			
206	*Dactyloscopus amnis* Miller & Briggs, 1962	Marine-estuarine	Soft bottom	LC
	Family Blenniidae (1)			
207	*Hypsoblennius maculipinna* (Regan, 1903)	Freshwater-estuarine	Soft bottom	DD
	Family Gobiesocidae (1)			
208	*Gobiesox milleri* Briggs, 1955*	Marine	Reef-associated	DD
209	*Tomicodon abuelorum* Szelistowski, 1990	Estuarine	Soft bottom	EN
	Family Eleotridae (5)			
210	*Dormitator latifrons* (Richardson, 1844)	Freshwater-estuarine	Soft bottom	LC
211	*Eleotris picta* Kner, 1863	Freshwater-estuarine	Soft bottom	LC
212	*Erotelis armiger* (Jordan & Richardson in Jordan, 1895)	Marine-estuarine*	Soft bottom	DD
213	*Gobiomorus maculatus* (Günther, 1859)	Freshwater-estuarine	Soft bottom	LC
214	*Leptophilypnus panamensis* (Meek & Hildebrand, 1916)	Freshwater-estuarine*	Soft bottom	No E
	Family Gobiidae (19)			
215	*Bathygobius andrei* (Sauvage, 1880)	Marine-estuarine	Reef-associated	LC
216	*Bollmannia stigmatura* Gilbert, 1892	Marine	Soft bottom	DD
217	*Bollmannia umbrosa* Ginsburg, 1939	Marine	Soft bottom	DD
218	*Ctenogobius manglicola* (Jordan & Starks in Jordan, 1895)	Marine-estuarine	Soft bottom	LC
219	*Ctenogobius sagittula* (Günther, 1861)	Marine-estuarine	Soft bottom	LC
220	*Evermannia panamensis* Gilbert & Starks, 1904	Marine	Soft bottom	DD
221	*Evorthodus minutus* Meek & Hildebrand, 1928	Marine-estuarine	Soft bottom	LC
222	*Gobioides peruanus* (Steindachner, 1880)	Freshwater-estuarine	Soft bottom	LC
223	*Gobionellus liolepis* (Meek & Hildebrand, 1928)	Marine-estuarine	Soft bottom	DD
224	*Gobionellus microdon* (Gilbert, 1892)	Estuarine	Soft bottom	LC
225	*Gobiosoma* sp. 1*	Estuarine*	Soft bottom	-

Table 1. *Continued.*

SPECIES NO.	TAXON	LIFE HISTORY STATUS	HABITAT TYPE	IUCN RED LIST
226	*Gobiosoma* sp. 2*	Estuarine*	Soft bottom	-
227	*Lophogobius cristulatus* Ginsburg, 1939	Estuarine	Soft bottom	LC
228	*Microgobius crocatus* Birdsong, 1968	Estuarine	Soft bottom	LC
229	*Microgobius curtus* Ginsburg, 1939	Estuarine	Soft bottom	LC
230	*Microgobius erectus* Ginsburg, 1938	Marine	Soft bottom	LC
231	*Microgobius miraflorensis* Gilbert & Starks, 1904	Estuarine	Soft bottom	LC
232	*Microgobius tabogensis* Meek & Hildebrand, 1928	Estuarine	Soft bottom	LC
233	*Parrella lucretiae* (Eigenmann & Eigenmann, 1888)	Marine-estuarine	Soft bottom	LC
	Family Microdesmidae (2)			
234	*Cerdale paludicola* Dawson, 1974	Estuarine	Soft bottom	DD
235	*Microdesmus dipus* Günther, 1864	Marine-estuarine	Soft bottom	DD
	Family Ephippidae (2)			
236	*Chaetodipterus zonatus* (Girard, 1858)	Marine	Soft bottom	LC
237	*Parapsettus panamensis* Steindachner, 1876	Marine	Soft bottom	LC
	Family Sphyraenidae (1)			
238	*Sphyraena ensis* Jordan & Gilbert, 1882	Marine	Pelagic	LC
	Family Trichiuridae (1)			
239	*Trichiurus nitens* Garman, 1899*	Marine-estuarine	Soft bottom	No E
	Family Scombridae (1)			
240	*Scomberomorus sierra* Jordan & Starks in Jordan, 1895	Marine	Pelagic	LC
	Family Stromateidae (1)			
241	*Peprilus medius* (Peters, 1869)	Marine	Soft bottom	LC
	Order Pleuronectiformes			
	Family Paralichthyidae (9)			
242	*Ancylopsetta dendritica* Gilbert, 1890	Marine	Soft bottom	LC
243	*Citharichthys gilberti* Jenkins & Evermann, 1889	Marine-estuarine	Soft bottom	LC
244	*Citharichthys platophrys* Gilbert, 1891	Marine	Soft bottom	LC
245	*Cyclopsetta panamensis* (Steindachner, 1875)	Marine-estuarine	Soft bottom	LC
246	*Cyclopsetta querna* (Jordan & Bollman, 1890)	Marine-estuarine	Soft bottom	LC
247	*Etropus crossotus* Jordan & Gilbert, 1882	Marine-estuarine	Soft bottom	No E
248	*Paralichthys woolmani* Jordan & Williams in Gilbert, 1897	Marine-estuarine	Soft bottom	DD
249	*Syacium latifrons* (Jordan & Gilbert, 1882)	Marine	Soft bottom	LC
250	*Syacium ovale* (Günther, 1864)	Marine	Soft bottom	LC
	Family Bothidae (1)			
251	*Engyophrys sanctilaurentii* Jordan & Bollman, 1890	Marine	Soft bottom	LC
	Family Achiridae (7)			
252	*Achirus klunzingeri* (Steindachner, 1879)	Marine	Soft bottom	LC
253	*Achirus mazatlanus* (Steindachner, 1869)	Amphidromous	Soft bottom	LC
254	*Achirus scutum* (Günther, 1862)	Amphidromous	Soft bottom	LC
255	*Trinectes fimbriatus* (Günther, 1862)	Marine	Soft bottom	LC
256	*Trinectes fluviatilis* (Meek & Hildebrand, 1928)	Amphidromous	Soft bottom	LC
257	*Trinectes fonsecensis* (Günther, 1862)	Marine-estuarine	Soft bottom	LC
258	*Trinectes xanthurus* Walker & Bollinger, 2001	Marine-estuarine	Soft bottom	LC
	Family Cynoglossidae (4)			
259	*Symphurus chabanaudi* Mahadeva & Munroe, 1990	Marine-estuarine	Soft bottom	LC
260	*Symphurus fasciolaris* Gilbert, 1892	Marine	Soft bottom	LC
261	*Symphurus leei* Jordan & Bollman, 1890	Marine	Soft bottom	LC
262	*Symphurus williamsi* Jordan & Culver in Jordan, 1895	Marine-estuarine	Soft bottom	LC
	Order Tetraodontiformes			
	Family Balistidae (4)			
263	*Balistes polylepis* Steindachner, 1876	Marine	Reef-associated	LC
264	*Canthidermis maculata* (Bloch, 1786)	Marine	Reef-associated	No E
265	*Pseudobalistes naufragium* (Jordan & Starks in Jordan, 1895)	Marine	Reef-associated	LC
266	*Sufflamen verres* (Gilbert & Starks, 1904)	Marine	Reef-associated	LC
	Family Monacanthidae (2)			
267	*Aluterus monoceros* (Linnaeus, 1758)	Marine	Reef-associated	No E
268	*Aluterus scriptus* (Osbeck, 1765)	Marine	Reef-associated	No E
	Family Tetraodontidae (6)			
269	*Arothron hispidus* (Linnaeus, 1758)	Marine-estuarine	Multiple habitat	No E
270	*Guentheridia formosa* (Günther, 1870)	Marine-estuarine	Soft bottom	LC
271	*Sphoeroides annulatus* (Jenyns, 1842)	Marine-estuarine	Multiple habitat	LC
272	*Sphoeroides lobatus* (Steindachner, 1870)	Marine-estuarine	Soft bottom	LC
273	*Sphoeroides rosenblatti* Walker in Walker & Bussing, 1996	Marine-estuarine	Soft bottom	LC
274	*Sphoeroides trichocephalus* (Cope, 1870)	Marine	Soft bottom	LC

species (3.3%) (Figure 2B). The dominance of estuarine-associated and soft-bottom dwelling fishes reflects the fact that the inner Gulf primarily consists of a large estuarine habitat with soft bottom.

Classification by IUCN Red List status revealed that the fauna of the inner Gulf contains the following 13 threatened species (Table 1): *Sphyrna lewini* (Sphyrnidae), *Echinorhinus cookei* (Echinorhinidae), *Diplobatis ommata*, *Narcine vermiculatus* (Narcinidae), *Pristis pristis* (Pristidae), *Rhinobatos leucorhynchus* (Rhinobatidae), *Aetobatus narinari* (Myliobatidae), *Pisodonophis daspilotus* (Ophichthidae), *Notarius cookei* (Ariidae), *Batrachoides boulengeri* (Batrachoididae), *Poeciliopsis elongata* (Poeciliidae), *Hippocampus ingens* (Syngnathidae) and *Tomicodon abuelorum* (Gobiesocidae).

Discussion

Erdman (1971) reported on the occurrence of some fish species in Gulf of Nicoya. Although voucher information was not provided for the vast majority of species in his report, he listed some species from the inner Gulf that were not recorded in the present study. These species were *Carcharhinus limbatus*, *Rhizoprionodon longurio* (Carcharinidae), *Sphyrna mokarran*, *S. media* (Sphyrnidae), *Manta birostris* as *M. hamiltoni* (Myliobatidae), *Gobiesox milleri* (Gobiesocidae) and *Epinephelus quinquefasciatus* as *E. itajara* (Serranidae). Of these species, *G. milleri* had already been reported from the inner Gulf as its type locality is Caballo Island, Gulf of Nicoya (Briggs 1955), and Erdman (1971) described the environment where the holotype of *G. milleri* was collected. Although no specimen of this species was identified in the UCR collection in the present study, *G. milleri* was included in the species list of the inner Gulf of Nicoya (Table 1) based on its original description (Briggs 1955).

The present study indicates that the inner part of the Gulf has more than 21% of the total number of shorefish species (almost 1300 according to Robertson and Allen (2008)) from the TEP region. The Gulf of Nicoya has a rich marine biodiversity, despite its small area compared with the entire TEP.

Of the threatened species reported in this study, seven are chondrichthyans; these species bear few pups or eggs, and are considered to have a low reproductive ability and are therefore highly susceptible to overfishing (Stevens *et al.* 2000). In addition, as mentioned before, Erdman (1971) reported five additional species of chondrichthyans from the inner Gulf in 1950s. The remainder of threatened species identified in this study are estuarine-associated species, except for *H. ingens*. Herein specimens collected since 1962 were examined but specimens collected in 21st century are so few that the recent status of these endangered species in this region cannot be assessed. It is known that fishing in estuarine and nearshore environments has clear impacts on the structure and function of these ecosystems (Blaber *et al.* 2000) and, in the Gulf of Nicoya, shrimp trawl fisheries have been one of the most important economic activities since 1952 (Blanco 2007). Fisheries exploitation and increased nutrient loadings strongly affect fish abundance and production in estuaries (Breitburg *et al.* 2009) and a sustainable future within the ecosystem needs improved policy and management decisions that are backed by sound scientific knowledge (Kabat *et al.* 2012). To further protect the entire Gulf ecosystem, additional research into the fish fauna and the distribution pattern of individual species within the Gulf is required. The present study revealed fish diversity and the biological characteristics of the inner Gulf but additional basic information is required to understand and then conserve the biodiversity of the entire Gulf of Nicoya.

Table 2. The number of species in the most speciose families recorded from the inner Gulf of Nicoya.

RANKING	FAMILY	NUMBER OF SPECIES	% IN TOTAL FAUNA
1	Sciaenidae	31	11.4
2	Gobiidae	19	7.0
4	Carangidae	18	6.6
4	Haemulidae	18	6.6
5	Ariidae	14	5.1
6	Engraulidae	12	4.4
7	Serranidae	10	3.7
8	Paralichthyidae	9	3.3
10	Achiridae	7	2.6
10	Gerreidae	7	2.6
13	Ophichthidae	6	2.2
13	Pristigasteridae	6	2.2
13	Tetraodontidae	6	2.2
17	Batrachoididae	5	1.8
17	Centropomidae	5	1.8
17	Eleotridae	5	1.8
17	Lutjanidae	5	1.8
20	Balistidae	4	1.5
20	Cynoglossidae	4	1.5
20	Urotrygonidae	4	1.5
25	Clupeidae	3	1.1
25	Hemiramphidae	3	1.1
25	Mugilidae	3	1.1
25	Narcinidae	3	1.1
25	Triglidae	3	1.1
	Subtotal	210	76.6
	Other families	64	23.4
	Total	274	100.0

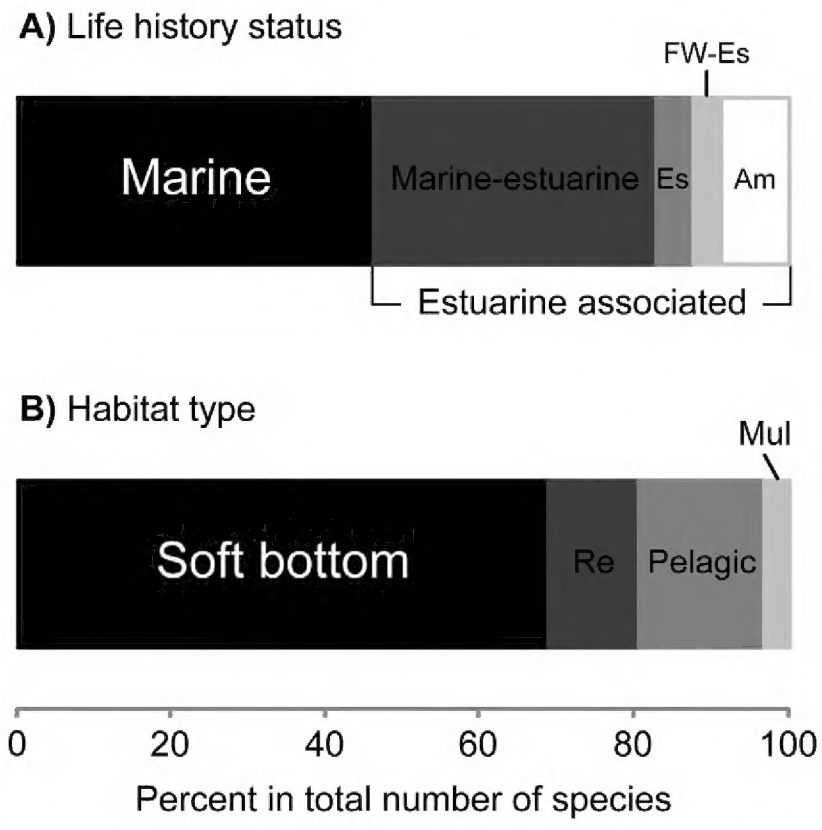

Figure 2. Species composition (%) with respect to life history status (A) and habitat type (B). Some categories abbreviated as AM, amphidromous; Es, estuarine; FW-Es, freshwater-estuarine; Mul, multiple habitat; Re, reef associated.

Taxonomic and ecological remarks

Additional information is provided here for species marked with an asterisk next to the scientific name in the species list (Table 1). UROTRYGONIDAE: *Urotrygon* sp. — Some specimens of *Urotrygon* examined here (UCR1515-03 and 2387-08) were similar to *U. nana* in having a smooth surface of the disc and tail, but differ in having a relatively large eye, which is more characteristic of *U. serrula* (see Robertson and Allen 2008). However, *U. serrula* is known only from Peru and is poorly known taxonomically. The specimens are thus listed as *Urotrygon* sp. DASYATIDAE: *Dasyatis longa* — Scientific name follows Page *et al.* (2013). ANTENNARIIDAE: *Fowlerichthys avalonis* — Scientific name follows Arnold and Pietsch (2012). SERRANIDAE: *Hyporthodus acanthistius*, *Hyporthodus exsul* and *Hyporthodus niphobles* — Scientific names follow Craig *et al.* (2011). CARANGIDAE: *Gnathanodon speciosus* — The habitat type follows Travers *et al.* (2010). GERREIDAE: *Diapterus brevirostris* — Scientific name follows González-Acosta *et al.* (2007). HAEMULIDAE: *Genyatremus dovii* and *Genyatremus pacifici* — Scientific names follow Tavera *et al.* (2011). GOBIESOCIDAE: *Gobiesox milleri* — No specimen was examined in the present study but the holotype was captured from Caballo Island (misspelled in the original description as "Cabello Island"), in the inner Gulf of Nicoya (Briggs 1955; Erdman 1971). ELEOTRIDAE: *Erotelis armiger* — Although this species was described as a marine fish (Robertson and Allen, 2008; Froese and Pauly 2011), the specimens examined here were collected in estuarine habitats. The species is therefore listed as a marine-estuarine species. *Leptophilypnus panamensis* — The specimens examined here were collected 6 km upstream from the river mouth that runs into the inner Gulf of Nicoya. The list of species of Eleotridae in Robertson and Allen (2008) does not include any information on this species but Thacker *et al.* (2006) described it taxonomically and stated that the species seems to inhabit tidal freshwater environments. Accordingly, *L. panamensis* is considered here as a freshwater-estuarine species. GOBIIDAE: *Gobiosoma* sp. 1 — Two gobiid specimens (UCR 0962-21) agree with the description of the genus *Gobiosoma* of Robertson and Allen (2008), but at the species level, there are no species matching the specimens' characteristics (*i.e.,* head without barbels; body scales present in the area beneath a line connecting the center of the second dorsal-fin base and the inner part of the pectoral-fin base; and no body pigmentation). These specimens are herein listed as *Gobiosoma* sp. 1 and because they were collected near the mouth of Río Coyolito, in the northeastern part of the Gulf and along with some estuarine species such as eleotrids and *Eucinostomus currani*, *Gobiosoma* sp. 1 is treated as an estuarine species. *Gobiosoma* sp. 2 — A gobiid specimen (UCR 0889-06) agrees with the description of the genus *Gobiosoma* of Robertson and Allen (2008), but the specimen has the following characteristics: anterior nostril-tube elongate, protruding from snout; body scale distribution as per *G.* sp. 1 above; pectoral-fin long, reaching to level of anus; no characteristic coloration on the body but with the dorsal- and anal-fins bearing some pigmentation. This specimen of *Gobiosoma* is listed as *Gobiosoma* sp. 2 and because the specimen was collected in the estuarine habitat of Chomes, in the northeastern part of the Gulf and along with some estuarine species such as gobies, *Centropomus*, and *Citharichthys*, *Gobiosoma* sp. 2 is considered here as an estuarine species. TRICHIURIDAE: *Trichiurus nitens* — Scientific name follows Burhanuddin and Parin (2008).

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Appendix. UCR Catalog Number, number of individuals, and size of examined voucher specimens from the inner part of the Gulf of Nicoya were provided here. Bold numbers indicate the species number given for each species in Table 1. The number of individuals and size of the specimen(s) follow in parentheses.

TRIAKIDAE — **1.** UCR0314-09 (1, 479.0 mm TL). CARCHARINIDAE — **2.** UCR 0314-10 (7, 275.1–486.3 mm TL), UCR 1956-02 (1, 315.6 mm TL). SPHYRNIDAE — **3.** UCR1105-02 (1, 459.3 mm TL); **4.** UCR 0297-36 (1, 472.2 mm TL). ECHINORHINIDAE — **5.** UCR0589-01 (1, 928.5 mm TL). NARCINIDAE — **6.** UCR0236-02 (2, 132.7–190.6 mm TL); **7.** UCR0236-11 (1, 530.7 mm TL); **8.** UCR0259-01 (4, 152.7–261.5 mm TL), UCR1511-02 (1, 255.4 mm TL). PRISTIDAE — **9.** UCR0419-01 (1, 697.8 mm TL). RHINOBATIDAE — **10.** UCR0297-34 (5, 174.9–258.6 mm TL), UCR2452-02 (1, 192.3 mm TL); **11.** UCR0820-03 (1, 228.0 mm TL). UROTRYGONIDAE — **12.** UCR0293-01 (1, 370.3 mm TL), UCR 1511-01 (1, 427.8 mm TL); **13.** UCR 2386-01 (2, 194.7-266.7 mm TL, paratypes of *Urotrygon cimar*); **14.** UCR1290-01 (10, 123.3–271.7 mm TL), UCR 1515-03 (2, 215.8–231.1 mm TL), UCR 2387-08 (4, 103.4–140.8 mm TL); **15.** UCR1515-01 (1, 153.8 mm TL), 2386-03 (2, 107.2-139.7 mm TL). DASYATIDAE — **16.** UCR1341-06 (2, 224.2–236.0 mm DW), 1886-01 (2, 142.6–148.1 mm DW). MYLIOBATIDAE — **17.** UCR0222-04 (1, 365.8 mm DW). ELOPIDAE — **18.** UCR0036-03 (1, 338.2 mm SL), UCR1546-02 (4, 76.3–108.7 mm SL). ALBULIDAE — **19.** UCR2183-04 (1, 88.3 mm SL); **20.** UCR0302-14 (1, 192.9 mm SL). MORINGUIDAE — **21.** UCR1462-01 (1, 179.2 mm TL), UCR1676-05 (5, 103.4–209.0 mm TL). MURAENIDAE — **22.** UCR1514-02 (1, 633.0 mm TL), UCR1676-07 (2, 464.1–689.1 mm TL); **23.** UCR 2539-01 (1, 349.9 mm TL). OPHICHTHIDAE — **24.** UCR0293-29 (1, 666.0 mm TL), UCR1193-01 (1, 1270.8 mm TL); **25.** UCR0293-28 (1, 534.5 mm TL); **26.** UCR0889-13 (6, 151.3–245.8 mm TL), UCR1676-12 (1, 103.4 mm TL); **27.** UCR0777-04 (1, 630.5 mm TL); **28.** UCR0777-03 (1, 706.0 mm TL); **29.** UCR1349-01 (1, 604.9 mm TL), UCR1355-01 (1, 723.2 mm TL), UCR1676-01 (1, 562.7 mm TL). MURAENESOCIDAE — **30.** UCR1223-06 (1, 435.2 mm TL), UCR1289-15 (4, 465.5–847.0 mm TL). PRISTIGASTERIDAE — **31.** UCR0317-27 (4, 62.6–86.6 mm SL), UCR1223-11 (1, 142.8 mm SL); **32.** UCR1287-07 (1, 70.4 mm SL), UCR1289-08 (4, 62.8–75.0 mm SL), UCR1664-10 (2, 69.0–74.6 mm SL); **33.** UCR0222-08 (6, 135.4–171.0 mm SL); **34.** UCR0297-24 (2, 166.4–177.1 mm SL); **35.** UCR0222-20 (2, 126.4–139.9 mm SL), UCR1340-12 (10, 55.5–86.4 mm SL); **36.** UCR0302-17 (4, 115.0–134.8 mm SL). ENGRAULIDAE — **37.** UCR1145-09 (37, 42.7–53.0 mm SL); **38.** UCR0314-27 (4, 67.6-100.5 mm SL), 2360-25 (1, 81.1 mm SL); **39.** UCR1145-16 (1, 61.7 mm SL); **40.** UCR1676-08 (8, 33.3–99.6 mm SL); **41.** UCR2387-07 (45, 49.4–63.9 mm SL); **42.** UCR0236-62 (1, 109.5 mm SL), UCR0317-04 (6, 111.2–119.4 mm SL), UCR1269-02 (69, 28.6–95.5 mm SL); **43.** UCR0224-14 (10, 119.6–135.5 mm SL), UCR1221-13 (1, 114.8 mm SL); **44.** UCR1145-12 (10, 55.6–58.7 mm SL), UCR1782-01 (104, 22.3–75.4 mm SL); **45.** UCR1511-03 (1, 101.4 mm SL), UCR2387-06 (15, 66.3–107.4 mm SL); **46.** UCR 1145-11 (10, 83.8–95.2 mm SL), UCR1223-08 (2, 108.6–119.4 mm SL), UCR2184-06 (2, 101.6–112.6 mm SL); **47.** UCR0314-07 (3, 129.9–131.7 mm SL); **48.** UCR1338-04 (5, 104.0–190.5 mm SL), 1340-08 (32, 105.8–160.9 mm SL). CLUPEIDAE — **49.** UCR1130-19 (2, 108.7–119.0 mm SL); **50.** UCR0236-14 (7, 113.6–120.6 mm SL), UCR1041-09 (1, 97.1 mm SL), UCR1147-07 (27, 59.0–66.0 mm SL); **51.** UCR1029-01 (10, 150.2–181.8 mm SL). CHANIDAE — **52.** UCR1093-01 (2, 168.9–176.5 mm SL), UCR1651-01 (1, 82.0 mm SL), UCR1955-01 (1, 190.7 mm SL), UCR2184-03 (1, 127.4 mm SL). ARIIDAE — **53.** UCR2461-02 (2, 130.1–163.5 mm SL); **54.** UCR0236-52 (2, 213.2–215.3 mm SL), UCR1041-02 (1, 178.3 mm SL), UCR1661-01 (3, 120.5–126.8 mm SL), UCR1756-06 (1, 139.5 mm SL), UCR2062-01 (1, 153.8 mm SL); **55.** UCR0317-09 (2, 289.3–345.5 mm SL), UCR1130-13 (1, 260.8 mm SL), UCR1139-05 (2, 140.8–331.8 mm SL); **56.** UCR0317-11 (3, 272.6–306.3 mm SL), UCR1041-01 (1, 233.6 mm SL), UCR1139-03 (1, 277.2 mm SL), UCR1459-01 (51.1mm SL); **57.** UCR0297-63 (3, 133.9–185.6 mm SL), 0302-43 (7, 141.9–215.2 mm SL); **58.** UCR0222-36 (1, 146.6 mm SL), UCR0236-43 (3, 178.9–227.8 mm SL), UCR0297-02 (5, 167.4–216.3 mm SL), UCR0317-05 (6, 185.4–244.1 mm SL), UCR1041-03 (1, 161.3 mm SL), UCR1341-08 (1, 287.0 mm SL); **59.** UCR0236-46 (2, 154.1–174.2 mm SL), UCR0297-03 (5, 96.7–196.7 mm SL), UCR0317-07 (5, 148.7–197.9 mm SL), UCR2200-11 (3, 139.6–158.2 mm SL); **60.** UCR2387-21 (3, 131.8–134.5 mm SL); **61.** UCR0297-04 (4, 102.8–220.1 mm SL), UCR0302-42 (1, 144.5 mm SL); **62.** UCR0314-03 (1, 173.7 mm SL); **63.** UCR2360-38 (1, 113.1 mm SL); **64.** UCR0236-42 (6, 142.0–254.5 mm SL), UCR1186-12 (1, 173.6 mm SL); **65.** UCR1362-01 (1, 313.9 mm SL); **66.** UCR0297-61 (2, 150.6–196.2 mm SL), UCR1041-11 (5, 163.8–176.2 mm SL), UCR1269-16 (1, 181.3 mm SL), UCR2166-01 (1, 190.7 mm SL), UCR2204-01 (1, 135.8 mm SL). ATELEOPODIDAE — **67.** UCR1961-01 (1, 368.0 mm SL). SYNODONTIDAE — **68.** UCR0223-04 (1, 127.4 mm SL), UCR1041-10 (1, 151.0 mm SL), UCR1130-12 (2, 165.3–288.8 mm SL), UCR1664-06 (2, 160.8–173.8 mm SL), UCR2200-09 (1, 135.9 mm SL); **69.** UCR0302-30 (2, 203.3–227.9 mm SL). OPHIDIIDAE — **70.** UCR0224-11 (3, 207.2–237.6 mm SL), UCR1130-22 (2, 235.9–237.9 mm SL), UCR1186-04 (1, 243.2 mm SL). BATRACHOIDIDAE — **71.** UCR1367-03 (1, 217.2 mm SL), UCR2165-01 (1, 210.6 mm SL); **72.** UCR0317-20 (1, 102.1 mm SL), UCR1223-20 (1, 109.8 mm SL), UCR2183-10 (1, 196.0 mm SL); **73.** UCR1292-02 (1, 157.6 mm SL); **74.** UCR2360-36 (3, 52.7–53.6 mm SL), UCR2361-09 (27, 36.3–58.2 mm SL); **75.** UCR0820-01 (6, 85.1–143.0 mm SL). ANTENNARIIDAE — **76.** UCR0224-01 (1, 89.2mmSL), UCR1387-01 (1, 35.8mmSL). MUGILIDAE — **77.** UCR0797-01 (3, 52.0–109.3 mm SL), UCR0962-01 (17, 35.5–101.8 mm SL), UCR2497-02 (1, 24.3 mm SL); **78.** UCR1147-01 (3, 158.2–176.6 mm SL), UCR1268-05 (2, 120.4–123.5 mm SL), UCR1664-11 (1, 90.0 mm SL), UCR2183-03 (27, 51.7–77.5 mm SL), UCR2184-01 (2, 63.7–86.0 mm SL); **79.** UCR0222-02 (1, 116.5 mm SL). AHERINOPSIDAE — **80.** UCR1793-09 (2, 48.3–50.0 mm SL), UCR2455-04 (12, 32.1–52.2 mm SL), UCR2682-04 (11, 41.9–61.4 mm SL); **81.** UCR1664-12 (11, 80.0–107.6 mm SL), UCR1793-08 (1, 131.9 mm SL). EXCOETIDAE — **82.** UCR1653-04 (1, 17.8 mm SL), UCR2153-06 (2, 17.3–20.0 mm SL); **83.** UCR2224-02 (1, 12.0 mm SL). HEMIRAMPHIDAE — **84.** UCR0820-08 (7, 189.5–210.4 mm SL); **85.** UCR0302-01 (1, 164.3 mm SL); **86.** UCR1664-09 (2, 93.7–103.0 mm SL), UCR1684-04 (7, 90.4–106.5 mm SL), UCR1755-03 (21, 93.3–135.6 mm SL). BELONIDAE — **87.** UCR2229-01 (1, 371.4 mm SL), UCR2231-01 (2, 235.4–257.6 mm SL, upper jaw tips damaged and sizes measured approximately); **88.** UCR1648-01 (3, 11.8–42.7 mm SL). ANABLEPIDAE — **89.** UCR1546-04 (20, 16.3–58.4 mm SL), 2682-08 (1, 67.5 mm SL). POECILIIDAE — **90.** UCR0889-02 (65, 41.1–99.7 mm SL), UCR2453-04 (1, 41.3 mm SL); **91.** UCR0792-04 (79, 10.5–48.3 mm SL). SYNGNATHIDAE — **92.** UCR2153-01 (1, 74.0 mm TL); **93.** UCR1754-02 (5, 49.7–58.1 mm SL), UCR2151-01 (1, 99.3 mm SL), UCR2153-13 (3, 46.3–56.2 mm SL). FISTULAIIDAE — **94.** UCR0594-01 (1, 703.3 mm SL), UCR1892-01 (2, 314.1–321.8 mm SL); **95.** UCR1511-06 (1, 192.9 mm SL). SCORPAENIDAE — **96.** UCR1388-02 (1, 216.0 mm SL), UCR1819-04 (1, 213.2 mm SL). TRIGLIDAE — **97.** UCR0223-06 (3, 28.9–98.1 mm SL), UCR0820-04 (1, 133.2 mm SL), UCR1130-20 (2, 78.4–95.5 mm SL), UCR1222-07 (1, 91.0 mm SL), UCR2387-15 (7, 30.3–72.4 mm SL); **98.** UCR0236-06 (1, 175.6 mm SL), UCR0302-15 (1, 138.4 mm SL), UCR1130-29 (1, 85.2 mm SL); **99.** UCR0223-11 (1, 138.6 mm SL). CENTROPOMIDAE — **100.** UCR1046-

02 (1, 184.7 mm SL); **101.** UCR2682-01 (1, 88.9 mm SL); **102.** UCR0889-17 (1, 101.9 mm SL), 2682-12 (2, 77.6–166.7 mm SL); **103.** UCR1147-22 (16, 45.2-126.6 mm SL), UCR1186-07 (1, 182.9 mm SL), UCR2682-13 (1, 71.8 mm SL); **104.** UCR0314-18 (4, 139.6-152.2 mm SL), UCR1338-06 (3, 188.0-205.0 mm SL), UCR2183-07 (7, 77.1-109.4 mm SL). SERRANIDAE — **105.** UCR0302-32 (1, 131.6 mm SL); **106.** UCR1184-01 (1, 129.1 mm SL); **107.** UCR0223-08 (1, 108.5 mm SL); **108.** UCR0297-47 (2, 158.9–182.1 mm SL), UCR2977-02 (1, 116.7 mm SL); **109.** UCR0036-16 (1, 173.1 mm SL), UCR0079-02 (2, 98.3–183.0 mm SL), UCR0297-22 (1, 120.4 mm SL), UCR1819-03 (1, 400.3 mm SL); **110.** UCR1819-07 (1, 151.6 mm SL); **111.** UCR0820-06 (1, 159.0 mm SL), UCR1819-01 (1, 453.5 mm SL); **112.** UCR2200-15 (2, 17.0–18.9 mm SL); **113.** UCR1819-02 (1, 279.6 mm SL); **114.** UCR0036-15 (1, 161.4 mm SL), UCR0294-05 (3, 128.1–143.5 mm SL), UCR1511-05 (2, 134.1–157.7 mm SL), UCR2207-01 (4, 58.0–92.0 mm SL). OPISTOGNATHIDAE — **115.** UCR0259-02 (1, 140.3 mm SL); **116.** UCR2258-01 (1, 75.5 mm SL). CORYPHAENIDAE — **117.** UCR 2153-10 (1, 38.8 mm SL). CARANGIDAE— **118.** UCR1130-15 (1, 202.2 mm FL); **119.** UCR0036-11 (1, 350.6 mm FL), UCR1131-10 (1, 284.8 mm FL); **120.** UCR2200-03 (9, 43.6–55.9 mm FL); **121.** UCR1288-06 (2, 147.6–159.6 mm FL), UCR1664-05 (3, 88.8–152.2 mm FL); **122.** UCR1983-01 (1, 31.9 mm SL), UCR2103-01 (1, 37.9 mm SL); **123.** UCR 2360-17 (1, 172.5 mm FL); **124.** UCR 0317-28 (1, 34.7 mm FL), UCR1287-13 (1, 58.1 mm FL), UCR1518-03 (4, 49.6–68.1 mm FL), UCR2387-14 (1, 43.6 mm FL); **125.** UCR1147-21 (2, 142.4–193.2 mm SL), UCR2016-04 (1, 164.4 mm SL), UCR2184-07 (2, 76.8–115.6 mm SL); **126.** UCR 2395-01 (1, 124.2 mm SL); **127.** UCR1147-29 (6, 64.0–140.0 mm SL), UCR2200-07 (1, 99.9 mm SL); **128.** UCR 0236-15 (3, 144.7–208.1 mm FL), UCR1130-14 (2, 188.3–192.3 mm FL), UCR1931-02 (2, 126.9–160.7 mm FL); **129.** UCR1044-02 (1, 53.9 mm SL); **130.** UCR0222-12 (1, 97.4 mm SL); **131.** UCR0223-10 (16, 39.4–84.0 mm SL), UCR1130-16 (2, 183.8–193.7 mm SL); **132.** UCR 2209-04 (1, 25.6 mm SL); **133.** UCR 1754-01 (1, 24.2 mm SL), UCR1755-01 (1, 39.0 mm SL), UCR2200-02 (2, 26.4–41.4 mm SL); **134.** UCR1139-01 (1, 305.6 mm SL); **135.** UCR 1041-08 (6, 52.4–117.4 mm SL), UCR2200-04 (4, 27.4–42.7 mm SL). LUTJANIDAE — **136.** UCR1041-06 (1, 207.6 mm SL); **137.** UCR0036-09 (2, 137.5–139.9 mm SL), UCR1147-16 (2, 66.8–103.0 mm SL), UCR1800-02 (1, 113.7 mm SL), UCR2196-01 (2, 22.7–48.0 mm SL), UCR2682-11 (2, 73.3 mm SL); **138.** UCR1996-02 (1, 53.3 mm SL), UCR2165-02 (1, 139.9 mm SL), UCR2682-03 (1, 77.9 mm SL); **139.** UCR0302-06 (5, 53.7–86.8 mm SL), UCR1664-04 (9, 34.4–124.3 mm SL); **140.** UCR2200-10 (1, 108.6 mm SL). LOBOTIDAE — **141.** UCR2006-01 (2, 63.3–70.7 mm SL), UCR2153-04 (1, 22.5 mm SL), UCR2197-01 (1, 52.5 mm SL), UCR2224-01 (3, 15.3–44.1 mm SL), UCR2225-01 (3, 12.5–17.0 mm SL). GERREIDAE — **142.** UCR1186-08 (1, 75.9 mm SL); **143.** UCR0036-17 (3, 43.0–81.8 mm SL), UCR1147-14 (42, 35.6–68.0 mm SL), UCR1268-24 (2, 44.8–66.5 mm SL), UCR2979-01 (1, 118.6 mm SL); **144.** UCR0962-06 (36, 26.3–56.0 mm SL), UCR1288-01 (1, 113.7 mm SL); **145.** UCR0297-29 (5, 67.8–131.0 mm SL), UCR1288-02 (5, 74.9–104.2 mm SL); **146.** UCR1877-10 (1, 25.0 mm SL); **147.** UCR0797-12 (1, 70.4 mm SL); **148.** UCR1145-07 (6, 58.8–73.0 mm SL), UCR1147-13 (62, 48.5–84.2 mm SL). HAEMULIDAE — **149.** UCR0222-23 (1, 143.6 mm SL); **150.** UCR1388-01 (1, 406.6 mm SL); **151.** UCR0297-13 (2, 129.2–137.7 mm SL), 1044-05 (1, 91.9 mm SL); **152.** UCR0302-27 (3, 87.4–122.6 mm SL), UCR1145-04 (1, 81.2 mm SL), UCR1147-19 (2, 69.9–85.5 mm SL), UCR1292-10 (3, 226.7–290.6 mm SL), UCR1340-14 (1, 42.0 mm SL), UCR1367-06 (1, 212.0 mm SL), UCR2386-18 (5, 36.7–88.1 mm SL), UCR2387-09 (1, 41.7 mm SL); **153.** UCR0317-16 (1, 178.4 mm SL); **154.** UCR0302-03 (1, 147.7 mm SL); **155.** UCR0302-02 (3, 156.9–170.2 mm SL), UCR2386-09 (1, 209.3 mm SL); **156.** UCR0302-04 (4, 128.3–162.7 mm SL); **157.** UCR1186-10 (1, 113.3 mm SL); **158.** UCR0236-37 (6, 99.2–183.6 mm SL), UCR0293-17 (1, 179.7 mm SL), UCR1290-02 (1, 166.8 mm SL), UCR2360-18 (1, 221.9 mm SL); **159.** UCR1222-14 (1, 197.8 mm SL), 1288-10 (219.2 mm SL), 1338-01 (1, 184.0 mm SL), 1340-01 (1, 205.7 mm SL); **160.** UCR0222-34 (1, 138.1 mm SL), UCR0224-07 (1, 128.1 mm SL), UCR0236-63 (9, 98.7–161.0 mm SL), UCR0293-38 (2, 149.7–157.8 mm SL), UCR0297-21 (3, 148.3–172.7 mm SL), UCR1291-05 (1, 61.2 mm SL), UCR1338-02 (13, 60.8–157.1 mm SL), UCR1390-06 (1, 178.0 mm SL), UCR2977-01 (1, 135.7 mm SL); **161.** UCR0962-04 (6, 36.4–57.2 mm SL); **162.** UCR0036-08 (1, 63.7 mm SL), UCR2183-08 (3, 89.3–110.0 mm SL); **163.** UCR1268-27 (1, 117.1 mm SL, paratype of *Pomadasys empherus*); **164.** UCR0293-15 (1, 168.0 mm SL), UCR0294-12 (1, 194.1 mm SL), UCR1027-03 (32.0 mm SL), UCR1145-08 (117, 19.2–62.9 mm SL), UCR1147-17 (16, 40.9–73.2 mm SL), UCR1663-01 (1, 186.9 mm SL), UCR2360-03 (1, 281.3 mm SL), UCR2682-07 (3, 60.2–65.0 mm SL); **165.** UCR0236-10 (1, 184.0 mm SL), UCR0297-14 (2, 53.4–67.4 mm SL); **166.** UCR0302-05 (2, 135.6–161.2 mm SL), UCR1362-02 (1, 171.4 mm SL), UCR1390-05 (1, 175.5 mm SL). POLYNEMIDAE — **167.** UCR1044-06 (1, 99.2 mm SL), UCR1130-09 (3, 172.9–195.9 mm SL), UCR1222-05 (1, 203.3 mm SL), UCR1684-03 (3, 67.5–83.5 mm SL), UCR2200-01 (13, 29.6–45.8 mm SL); **168.** UCR1130-10 (2, 216.8–245.6 mm SL). SCIAENIDAE — **169.** UCR1383-03 (1, 154.5 mm SL), UCR1390-04 (1, 108.0 mm SL), UCR1676-03 (1, 111.0 mm SL), UCR2386-06 (2, 69.8–70.4 mm SL); **170.** UCR0222-45 (1, 162.6 mm SL), UCR1147-26 (1, 83.3 mm SL), UCR1526-01 (1, 165.4 mm SL); **171.** UCR1147-28 (1, 190.8 mm SL), UCR2296-01 (1, 221.0 mm SL); **172.** UCR1131-07 (1, 286.3 mm SL), UCR1223-14 (1, 85.7 mm SL), UCR1384-02 (1, 252.6 mm SL), UCR2003-01 (2, 81.6–90.8 mm SL); **173.** UCR0297-07 (1, 151.5 mm SL), UCR1390-02 (1, 227.8 mm SL), UCR2360-20 (2, 200.3–254.9 mm SL); **174.** UCR0224-13 (1, 67.0 mm SL), UCR0302-20 (2, 115.4–123.7 mm SL), UCR0302-36 (1, 142.8 mm SL), UCR0314-08 (4, 139.5–152.0 mm SL), UCR0314-26 (2, 158.9–188.6 mm SL), UCR1131-06 (2, 257.2–277.0 mm SL), UCR1147-27 (2, 113.8–156.5 mm SL), UCR1223-05 (1, 92.3 mm SL), UCR1289-10 (1, 105.8 mm SL); **175.** UCR1103-03 (3, 243.1–250.8 mm SL), UCR1131-05 (1, 356.9 mm SL); **176.** UCR0259-06 (3, 121.0–144.3 mm SL); **177.** UCR1131-12 (5, 154.3–204.9 mm SL), UCR1338-05 (2, 179.4–186.7 mm SL), UCR1837-02 (2, 171.8–191.1 mm SL); **178.** UCR0222-14 (1, 141.0 mm SL), UCR0259-04 (1, 165.9 mm SL); **179.** UCR0259-07 (1, 131.1 mm SL), UCR0297-08 (1, 74.4 mm SL), UCR1130-06 (6, 105.6–183.6 mm SL); **180.** UCR1130-07 (5, 90.6–121.2 mm SL); **181.** UCR1045-01 (1, 211.1 mm SL), UCR1450-01 (1, 350.6 mm SL); **182.** UCR1341-10 (228.3 mm SL), UCR1367-04 (1, 202.7 mm SL); **183.** UCR1450-02 (1, 294.0 mm SL); **184.** UCR1131-02 (1, 238.8 mm SL), UCR1222-09 (1, 146.5 mm SL), UCR1289-06 (1, 92.9 mm SL), UCR1837-03 (1, 142.5 mm SL); **185.** UCR1130-21 (1, 114.0 mm SL), UCR1131-08 (1, 271.6 mm SL), UCR2360-29 (1, 133.5 mm SL), UCR2361-03 (1, 240.9 mm SL); **186.** UCR0317-32 (2, 164.2–177.6 mm SL), UCR1221-19 (1, 186.4 mm SL), UCR1287-09 (1, 223.5 mm SL), UCR1390-03 (1, 189.9 mm SL), UCR2387-02 (1, 240.8 mm SL); **187.** UCR1221-04 (1, 91.4 mm SL); **188.** UCR1221-03 (1, 130.2 mm SL), UCR1287-04 (2, 138.1–143.7 mm SL); **189.** UCR0222-01 (1, 158.0 mm SL), UCR0224-04 (1, 143.0 mm SL), UCR0317-22 (2, 161.9-174.5 mm SL), UCR1367-01 (1, 353.9 mm SL), UCR1514-07 (1, 65.0 mm SL), UCR2386-05 (2, 175.5–198.7 mm SL); **190.** UCR0224-03 (1, 132.4 mm SL); **191.** UCR0222-26 (2, 143.5–183.3 mm SL); **192.** UCR0314-28 (8, 102.0–176.1 mm SL), UCR1289-14 (7, 211.0–272.9 mm SL), UCR1292-05 (8, 96.2–201.9 mm SL); **193.** UCR0228-02 (4, 71.9–99.2 mm SL), UCR1289-01 (4, 67.7–98.8 mm SL), UCR1837-07 (7, 79.3–108.9 mm SL); **194.** UCR0259-05 (1, 100.6 mm SL); **195.** UCR1287-03 (10, 99.6–134.2 mm SL), UCR1340-04 (1, 147.8 mm SL); **196.** UCR1287-12 (1, 117.2 mm SL), UCR1837-11 (1, 79.8 mm SL), UCR2003-03 (3, 67.3–115.2 mm SL); **197.** UCR1223-13 (1, 133.2 mm SL), 1837-04 (4, 65.6-116.4 mm SL); **198.** UCR1130-28 (16, 88.4–116.2 mm SL), UCR1221-10 (2, 86.1–96.5 mm SL), UCR1289-09 (1, 95.4 mm SL), UCR1837-09 (2, 99.1–101.5 mm SL); **199.** UCR0259-03 (1, 213.3 mm SL), UCR1386-01 (1, 261.4 mm SL). MULLIDAE — **200.** UCR0297-23 (2, 73.0–90.3 mm SL), UCR1390-01 (1, 161.4 mm SL), UCR1664-08 (3, 64.6–76.0 mm SL). KYPHOSIDAE — **201.** UCR2153-09 (2, 16.6-30.3 mm SL). CHAETODONTIDAE — **202.** UCR0302-34 (1, 29.2 mm SL), UCR1646-01 (1, 89.1 mm SL). CIRRHITIDAE — **203.** UCR1819-05 (1, 213.2 mm SL). POMACENTRIDAE — **204.** UCR0317-29 (1, 61.9 mm SL). URANOSCOPIDAE — **205.** UCR1514-01 (1, 322.1 mm SL). DACTYLOSCOPIDAE — **206.** UCR1756-03 (1, 56.6 mm SL). BLENNIIDAE — **207.** UCR2196-03 (1, 35.9mmSL), UCR2197-07 (1, 23.6mmSL). GOBIESOCIDAE — **209.** UCR 2097-01 (1, 23.8 mm SL, paratype of *Tomicodon abuelorum*), UCR2098-01 (2, 21.6–25.7 mm SL, paratype of *T. abuelorum*), UCR2099-01 (1, 24.2 mm SL, paratype of *T. abuelorum*), UCR2475-01 (1, 19.2 mm SL). ELEOTRIDAE — **210.** UCR0962-17 (28, 19.4–91.4 mm SL), UCR1147-05 (5, 61.9–136.8 mm SL), UCR2682-09 (1, 73.5 mm SL); **211.** UCR0962-20 (31, 14.5–292.7 mm SL), UCR2183-15 (1, 176.6 mm SL); **212.** UCR0889-09 (4, 44.0–108.6 mm SL), UCR1676-02 (12, 61.0–114.7 mm SL); **213.** UCR1268-01 (8, 58.9–171.0 mm SL), UCR2183-16 (3, 120.6–148.7 mm SL); **214.** UCR1268-18 (2, 27.8–29.7 mm SL). GOBIIDAE — **215.** UCR0889-08 (15, 72.3–123.6 mm SL), UCR1268-09 (1, 76.6 mm SL), UCR2682-10 (2, 63.9–87.9 mm SL); **216.** UCR1184-05 (1, 61.2 mm SL); **217.** UCR0820-07 (1, 66.8 mm SL); **218.** UCR0889-21 (65, 9.8–24.6 mm SL), UCR1799-08 (7, 10.0–17.1 mm SL); **219.** UCR0889-20 (47, 9.5–92.4 mm SL), UCR1268-12 (4, 24.6–45.3 mm SL), UCR1270-10 (2, 66.4–81.5 mm SL), UCR1864-03 (3, 40.5–67.3 mm SL); **220.** UCR2171-01 (1, 19.3 mm SL); **221.** UCR1546-07 (25, 11.1–16.5 mm SL), UCR1756-05 (2, 15.3–19.6 mm SL), UCR1782-02 (22, 11.3–22.9 mm SL); **222.** UCR0889-12 (1, 433.5 mm SL), UCR1340-09 (1, 301.8 mm SL); **223.** UCR1147-11 (2, 128.2–140.0 mm SL), UCR1288-05 (1, 100.8 mm SL); **224.** UCR1147-12 (3, 84.3–149.3 mm SL), UCR1268-11 (3, 27.9–46.5 mm SL); **225.** UCR0962-21 (2, 21.3–23.6 mm SL); **226.** UCR0889-06 (1, 19.7 mm SL); **227.** UCR1676-06 (1, 56.6 mm SL); **228.** UCR1269-06 (10, 24.7–34.9 mm SL), UCR1794-04 (3, 21.4–22.2 mm SL); **229.** UCR1269-18 (1, 21.1 mm SL), UCR1687-11 (1, 19.2 mm SL), UCR1799-07 (1, 26.0 mm SL); **230.** UCR2387-10 (1, 48.8 mm SL); **231.** UCR1268-22 (2, 24.1–30.2 mm SL); **232.** UCR2387-25 (1, 25.3 mm SL); **233.** UCR2205-01 (2, 26.2–30.7 mm SL), UCR2509-01 (2, 26.2–35.3 mm SL). MICRODESMIDAE — **234.** UCR1676-04 (1, 62.0 mm SL); **235.** UCR2473-01 (1, 26.1 mm SL). EPHIPPIDAE — **236.** UCR1186-05 (1, 56.3 mm SL); **237.** UCR0297-18 (1, 173.3 mm SL), 2360-15 (1, 104.9 mm SL). SPHYRAENIDAE — **238.** UCR0224-02 (1, 166.1 mm SL), UCR0297-60 (1, 307.0 mm SL), UCR1105-03 (1, 408.9 mm SL), UCR1367-05 (1, 172.6 mm SL). TRICHIURIDAE — **239.** UCR0224-08 (1, 441.5 mm TL), UCR0820-09

(1, 621.0 mm TL), UCR1837-01 (1, 654.0 mm TL). SCOMBRIDAE — **240.** UCR1130-11 (1, 418.9 mm FL), 1186-09 (1, 87.7 mm FL), 1649-01 (1, 134.7 mm FL), 1956-01 (1, 232.9 mm FL). STROMATIDAE — **241.** UCR0224-15 (1, 108.3 mm SL), UCR0302-35 (1, 135.9 mm SL), UCR1130-23 (1, 139.0 mm SL). PARALICHTHYIDAE — **242.** UCR0236-18 (1, 112.1 mm SL); **243.** UCR0889-07 (3, 89.7–157.4 mm SL), UCR1041-07 (1, 175.2 mm SL), UCR1044-08 (1, 107.9 mm SL), UCR1147-18 (3, 79.3–100.5 mm SL), UCR1268-02 (4, 54.3–121.1 mm SL), UCR1288-11 (1, 102.2 mm SL), UCR1290-12 (1, 88.1 mm SL), UCR1687-09 (4, 89.9–122.1 mm SL); **244.** UCR1931-01 (2, 76.7–90.1 mm SL); **245.** UCR0297-67 (1, 154.2 mm SL), UCR0302-09 (3, 84.5–128.3 mm SL); **246.** UCR0293-10 (1, 112.9 mm SL), UCR0297-11 (2, 91.5–125.8 mm SL), UCR0302-29 (1, 172.4 mm SL), UCR1130-26 (2, 148.4–195.5 mm SL), UCR1222-03 (1, 198.4 mm SL), UCR1289-07 (2, 54.6–56.0 mm SL), UCR1513-03 (1, 111.4 mm SL); **247.** UCR1288-03 (1, 94.9 mm SL); **248.** UCR1664-03 (1, 87.6 mm SL); **249.** UCR0236-01 (2, 162.0–167.6 mm SL), UCR0302-31 (2, 159.9–175.3 mm SL); **250.** UCR1288-04 (2, 74.0–95.1 mm SL). BOTHIDAE — **251.** UCR2006-02 (1, 84.1 mm SL). ACHIRIDAE — **252.** UCR1130-27 (1, 172.2 mm SL), UCR2360-35 (3, 161.9–199.4 mm SL); **253.** UCR1145-03 (6, 39.5–53.8 mm SL), UCR1290-19 (1, 44.6 mm SL), UCR1878-06 (1, 34.7 mm SL), UCR2360-41 (7, 113.7–197.7 mm SL); **254.** UCR0222-10 (2, 69.2–85.9 mm SL), UCR1222-06 (1, 55.5 mm SL), UCR1290-07 (1, 70.5 mm SL); **255.** UCR0222-11 (5, 58.0–67.8 mm SL), UCR0224-05 (2, 59.9–60.5 mm SL); **256.** UCR1147-02 (9, 31.6–38.5 mm SL); **257.** UCR0317-14 (1, 122.7 mm SL), UCR2360-14 (2, 136.5–146.8 mm SL); **258.** UCR0302-11 (5, 61.8–76.4 mmSL), 1514-05 (1, 44.2 mm SL), 2387-04 (12, 45.4–58.3 mm SL). CYNOGLOSSIDAE — **259.** UCR1221-17 (1, 140.9 mm SL), UCR2386-19 (6, 64.9–96.7 mm SL); **260.** UCR0302-23 (1, 114.6 mm SL); **261.** UCR2360-40 (1, 91.7 mm SL); **262.** UCR2360-37 (1, 63.4 mm SL), UCR2506-01 (1, 70.8 mm SL). BALISTIDAE — **263.** UCR1367-07 (1, 143.0 mm SL); **264.** UCR2209-02 (2, 18.0–56.3 mm SL); **265.** UCR2206-01 (1, 74.1 mm SL); **266.** UCR0302-33 (1, 37.3 mm SL). MONACANTHIDAE — **267.** UCR1367-02 (1, 296.7 mm SL); **268.** UCR1025-03 (1, 283.6 mm SL), UCR2209-03 (1, 60.5 mm SL). TETRAODONTIDAE — **269.** UCR0079-05 (1, 123.5 mm SL); **270.** UCR0036-06 (1, 210.4 mm SL), UCR0236-51 (1, 225.0 mm SL), UCR0293-30 (1, 203.5 mm SL), UCR0297-48 (1, 245.0 mm SL); **271.** UCR1287-11 (1, 102.0 mm SL), UCR1340-10 (1, 265.7 mm SL), UCR1341-01 (1, 313.2 mm SL), UCR1864-01 (2, 48.3–86.6 mm SL), UCR1878-07 (2, 29.3–48.0 mm SL), UCR2183-18 (1, 62.6 mm SL); **272.** UCR1338-08 (1, 34.7 mm SL); **273.** UCR0036-07 (1, 207.2 mm SL), UCR1147-03 (5, 30.2–88.3 mm SL), UCR1340-03 (1, 200.3 mm SL), UCR2183-09 (2, 85.9–106.1 mm SL); **274.** UCR0222-27 (1, 71.9 mm SL), UCR0224-16 (2, 54.8–65.8 mm SL), UCR1223-15 (1, 53.4 mm SL), UCR1291-03 (13, 43.2–68.0 mm SL).